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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/483,737	01/14/2000	Hansjorg Reichert	GR-97-P-1903	8769

7590

06/27/2003

Lerner And Greenberg PA
P O Box 2480
Hollywood, FL 33022-2480

EXAMINER

SEFER, AHMED N

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 06/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/483,737

Applicant(s)

REICHERT ET AL.

Examiner

A. Sefer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 15 is/are pending in the application.
- 4a) Of the above claim(s) 1-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 4/21/03 has been entered and claim 17 has been deleted.

Response to Arguments

2. Applicant's arguments filed on 4/21/03 have been fully considered but they are not persuasive.

3. Applicant contends that the references of record do not teach the device structure as recited in claims 15 and 17. Specifically, Applicant argues that Yamagishi et al do not disclose a direct connection of a semiconductor body with a substrate over a thin gold-tin solder layer but merely disclose a device structure without a brazing material between the chip 4 and the substrate 1.

4. In response, Examiner would like to point out that claim 15 recites "a semiconductor chip secured to said substrate by one of alloying and brazing using said solder" without any reference to a direct connection.

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5. Applicant argues that the tin content 12-20% of the range 12-37% disclosed by Komata et al does not produce a hypereutectic gold-tin alloy – Applicant seems to be silent in regards to the remainder (20-37%) of the of the tin content.

6. Examiner fully agrees that the tin content 12-20% of the range 12-37% disclosed by Komata et al does not produce a hypereutectic gold-tin alloy. Examiner also recognizes that a prima facie case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art. E.g., In re Geisler, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997).

7. Examiner acknowledges that the instant application has a filing date of 6/24/1998 and that Ivey et al US Patent No. 6,245,208 is not available as a prior art.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamagishi et al. (JP 6-291239) in view of Komata et al (JP 2-15897) and Bacon et al. US Patent No. 5,234,153.

Yamagishi et al disclose in fig. 1c a solder containing at least two components with at least two constituents including a first constituent containing a precious metal and a second constituent being consumed during a soldering operation by one of reacting and being dissolved in material which are to be joined; a substrate 1; and a semiconductor chip 4 secured to

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said substrate by one of alloying and brazing using said solder, but do not teach a hypereutectic composition of Au-Sn with a thickness.

Komata et al a precious metal and tin solder 13 and said solder has a hypereutectic concentration containing gold-tin (AuSn) with a hypereutectic Sn concentration and containing a gold-tin compound (AuSn) having a composition, which falls within the range recited in the claim.

Bacon et al. teach (see col. 1 lines 50-63 and claim 7) the advantage of using a thin gold-tin compound solder.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to replace the Au-Sn eutectic alloy of Yamagishi et al with a hypereutectic Sn concentration of Komata et al, since that would prevent deformation thereby enhancing the mechanical strength of a semiconductor chip connection to a substrate. It would have been obvious to form a layer with a thickness of 1 μm to 2 μm , since that would provide a better thermal conductance.

10. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamagishi et al. (JP 6-291239) in view of Ishii (JP 6-326210) and Bacon et al. US Patent No. 5,234,153.

Yamagishi et al disclose in fig. 1c a solder containing at least two components with at least two constituents including a first constituent containing a precious metal and a second constituent being consumed during a soldering operation by one of reacting and being dissolved in material which are to be joined; a substrate 1; and a semiconductor chip 4 secured to said substrate by one of alloying and brazing using said solder, but do not teach a hypereutectic composition of Au-Sn with a thickness.

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Ishii discloses (see fig. 2 and attached machine translated version) a semiconductor chip 1 secured to a substrate 40 by gold and tin solder 8 and said solder has a hypereutectic concentration containing gold-tin (AuSn) with a hypereutectic Sn concentration and containing a gold-tin compound (AuSn) having a composition which falls within the range recited in the claim.

Bacon et al. teach (see col. 1 lines 50-63 and claim 7) the advantage of using a thin gold-tin compound solder.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to replace the Au-Sn eutectic alloy of Yamagishi et al with a hypereutectic Sn concentration of Ishii, since that would prevent deformation thereby enhancing the mechanical strength of a semiconductor chip connection to a substrate. It would have been obvious to form a layer with a thickness of 1 μm to 2 μm , since that would provide a better thermal conductance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (703) 605-1227.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601.

ANS

June 19, 2003